PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39767	**FOR FURTHER ACTION** See Form PCT/IPEA/416	
International application No. PCT/FI2003/000694	International filing date *(day/month/year)* 24.09.2003	Priority date *(day/month/year)* 25.09.2002
International Patent Classification (IPC) or national classification and IPC F16J15/16, 15/40, 15/54, B63H23/32		
Applicant Eskola Lauri		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
01.03.2004	22.12.2005
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Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI2003/000694

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-4 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 6 received by this Authority on 15.12.2004
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-3 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELI[redacted]ARY REPORT ON PATENTABILITY

Inter[redacted]al application No.
PCT/FI2003/000694

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-4	YES
	Claims		NO
Inventive step (IS)	Claims	1-4	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-4	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 3934952 A
D2: GB 912403 A
D3: GB 1522739 A

Document D1, which is considered to represent the most relevant state of the art, discloses (see fig. 1, 2 and column 3, line 47-68) a method and a device to wash away dirt by flushing the outer seal rings (92, 94) of a sealing system of a shaft passing through the hull of a maritime vessel. Filtered sea water is pumped into an annular space (123), resulting in a higher pressure in said space (123) than the outer sea pressure, causing filtered sea water to flow outboard under the outer seal rings (92, 94). Said water is taken from the ship's sea water supply.

The subject-matter of claims 1 and 2 differs from the method and device disclosed in D1 in that an annular member surrounds the shaft and the outer seal and that a flushing flow is uniformly distributed about the periphery of the shaft and which flushing flow is established exiting the annular member into the space between the propeller and the hull of the vessel so as to prevent debris carried by the outside water from reaching the outer seal of the propeller shaft. The subject-matter of claims 1 and 2 is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention may therefore be regarded as that of providing a solution for preventing debris from reaching the outer seal and thereby preventing the contact between debris and the outer surface of the outer seal ring.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

The solution to this problem proposed in claims 1 and 2 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

D1 does not contain any information that would lead a person skilled in the art toward the modifications necessary in achieving the present invention according to claims 1 and 2. D2 discloses (see fig. 1) a housing secured to the hull of a ship enclosing a tail shaft bearing 10. The housing is provided with an opening (13) that open into an interior chamber (15) that surrounds the propeller shaft (16). The upper opening (13) is supplied with clean sea water under pressure for lubricating the tail shaft bearing (10) that produces positive and continued flow out through the tail shaft bearing and the stern tube of the ship. This functions to keep the bearing clean. D3 discloses (see fig. 1) a propeller shaft and bearing assembly for a ship in combination with a radial face type seal (7, 8, 13). A pipe connection (21) provides a clean water supply to the space adjacent the seal arrangement within the confinement of a rope guard (22). This type of solution causes swirls inside the rope guard, because the water flow is not divided uniformly around the shaft. These kinds of swirls will mix clean and dirty water inside the rope guard and create currents directed out from the rope guard in the area where the clean water is introduced, causing dirty water outside of the rope guard to flow inside the rope guard at other places. Hence, none of the cited documents D1-D3 give any indication that would lead a person skilled in the art to the claimed invention according to claims 1 and 2. Therefore, the claimed invention is not obvious to a person skilled in the art and consequently the invention according to claims 1 and 2 is considered to involve an inventive step.

However, an uncertainty whether two features in claims 1 and 2 goes beyond the application as filed is raised in Box VIII.

Claims 3 and 4 are dependent on claim 2 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

The invention according to claims 1-4 is considered to be industrially applicable.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The amended claims 1 and 2 contain the feature "the outer surface of" the outer seal. This feature ("the outer surface of") is not explicitly supported by the application as filed and could therefore be considered to go beyond the disclosure as filed. The subject-matter of amended claims 1 and 2 is still, without this feature, considered to involve an inventive step. Hence, said feature ("the outer surface of") should preferably be excluded from amended claims 1 and 2 in order to avoid the uncertainty of this feature going beyond the disclosure in the application as filed.

The amended claim 2 contains the feature "means" for distributing the said water flow substantially uniformly around the shaft. This general feature ("means") is not explicitly supported by the application as filed and could therefore be considered to go beyond the disclosure as filed. The description explicitly states (see page 4, line 18-line 21 and page 5, line3-line 6) that the nozzle ring/annular member (in claim 2) is provided with "an annular opening" or optionally "separate water discharge openings" may also be "made on the periphery of the annular body part". In Box V said "means" are considered to constitute these cited features in the description. Hence, said feature ("means") in claim 2 should preferably be amended to "an annular opening or separate water discharge openings made on the periphery of the annular body part" in order to avoid the uncertainty of this feature going beyond the disclosure in the application as filed.

What is claimed is:

1. A method for excluding the entry of debris to the outer surface of the outer seal (17) of the sealing system of a shaft (18) passing through the hull of a maritime vessel to the exterior side thereof, in which method flushing water is introduced to the immediate vicinity of the outer seal from an internal water source of the vessel, **characterized** in that the flushing flow thus established from a annular member (1) surrounding the shaft (18) and the outer seal (17) is directed toward the shaft and is uniformly distributed about the periphery of the shaft and which flushing flow is established escaping via at least one opening (22) of the annular member exiting into the space between the propeller and the hull of the vessel so as to prevent debris carried by the outside water from reaching the outer surface of the outer seal of the propeller shaft.

2. A device for excluding the entry of debris to the outer surface of the outer seal (17) of the sealing system of a shaft passing through the hull of a maritime vessel to the exterior side thereof, **characterized** in that said device comprises a annular member (1) surrounding the shaft (18) and the outer seal (17), said member including an internal flow distribution duct (25) and at least one opening (22) exiting from said distribution duct toward the periphery of said shaft for establishing a water flow escaping via the said opening exiting into the space between the propeller and the hull of the vessel so as to prevent debris carried by the outside water from reaching the seal of the propeller shaft, means for distributing the said water flow substantially uniformly around the shaft, as well as means (2, 4, 5) for feeding flushing water into said internal flow distribution duct from an internal water source of the vessel.

3. The device of claim 2, **characterized** in that the device has a plurality of said exit openings (22) of different sizes.

4. The device of claim 2 or 3, **characterized** in that said internal flow distribution duct (25) includes at least one constriction for establishing a uniformly distributed flushing water flow.